TRISKEM INFOS

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TRISKEM SHARING INNOVATION

RAPID METHODS

Fast methods for the determination of radionuclides, mainly actinides and strontium, in various environmental matrices are requested not only for emergency situations but also for laboratories routine analysis in order to gain time. In both cases, emergency situations and routine analysis, it is crucial to obtain accurate and reliable results. This depends on the efficient solubilisation of the radionuclides of interest from the sample as well as on both the sequential separation of the analytes and preparation of the test sample prior to the measurement itself.

We try hereafter to propose some methods of mineralisation for diverse matrices then separation schemes.

Figure 1 shows different path of mineralisation depending on matrice nature and quantity to be sampled.[1],[2],[3]

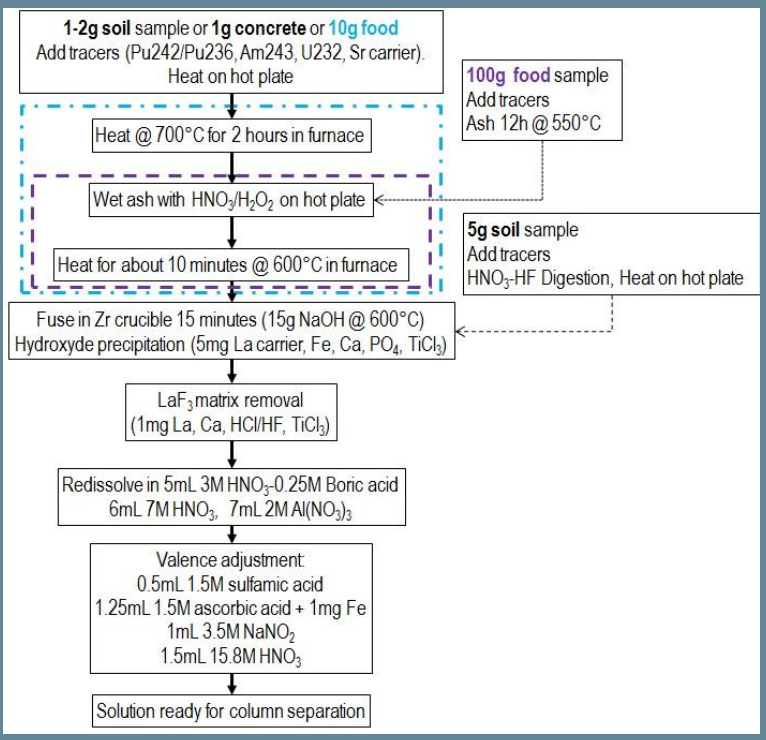

***Figure 1**: Synoptic of procedures used for pretreatment of different matrices.[1],[2],[3]*

Figure 2 presents the possible separation synopsis depending on the type of radioisotopes to be isolated. The authors use stacked cartridges for this separation.

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EDITO

Time seems to fly... Triskem International exists since 5 years and it seems like yesterday that we have started our own business.

I would like to thank you for your confidence and loyalty over these past years as well as for all your comments and suggestions which have helped us to continuously improve the quality of our products and services.

Triskem is ISO 9001/2008 certified since 2007, producing the greatest part of the extr.chrom resins sold in-house and it is continuing its development of new resins and applications to fit meet your needs.

Our new goal is to become your preferred supplier for all consumables and resins needed in a radiochemistry laboratory. In order to do so we are steadily increasing our product line. Please do not hesitate to tell us about the consumables you are searching and the quantities you need.

Since Chernobyl, rapid methods have been a topic, but they still gain in importance for home land security, radiation protection and environmental monitoring. Therefore our newsletter deals again with fast methods this time with focus on the determination of artificial alpha and beta emitters in various matrices.

In the hope to meet you in 2013 I wish you a Merry Christmas and a Happy New Year.

Michaela Langer
TRISKEM CEO

Happy Holidays and Best Wishes for year 2013

Please note that TrisKem will be closed from 24th to 1st January included

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Tips and Tricks

- ***Cs Resins***

We will add two new products to our radiochemistry product line in the upcoming weeks. Both are used for the concentration and separation of Cs from various liquid samples. Like the MnO_2-PAN resin both resins are based on very fine, selective inorganic materials embedded in an organic matrix (PAN). The active components are the widely employed AMP and KNiFC. We will provide you with more information in our next TrisKem Info.

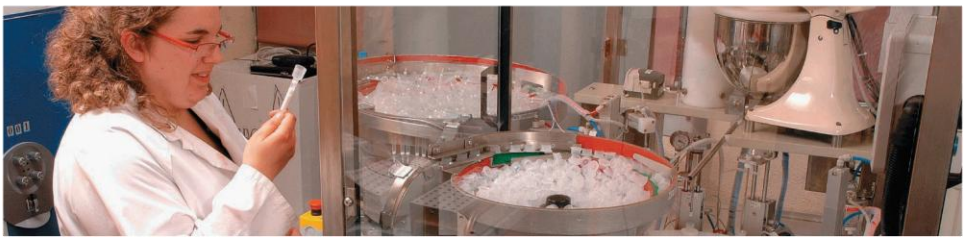
- **Cartridges:**

Some of you indicated that having the name of the resin printed on the cartridges would be useful. This is now done since this autumn.

Figure 3: TrisKem Cartridges

For orders of multiples of 50 cartridges, the cartridges are now delivered packed in boxes, containing 5 packs of 10 units to allow for a facilitated storage in cupboards.

Figure 4: Boxes of cartridges



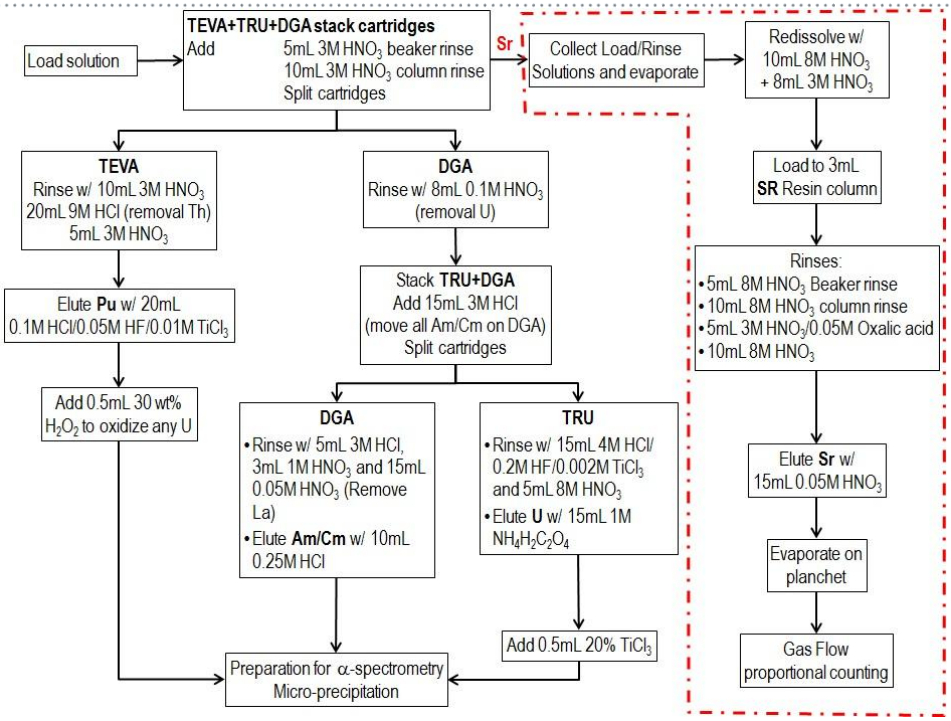


Figure 2: Separation scheme for the separation and determination of actinides (and Sr) from solutions obtained following procedures described in Fig. 1.

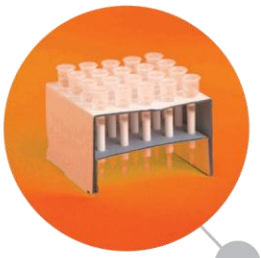
The solutions obtained using the described pre-treatment steps are separated at elevated flow rates using a vacuum box and stacked cartridges, separation steps are summarized in Fig. 2. Results can be obtained in 1 to 2 days (from pretreatment to end of counting) depending upon the matrices analyzed and detection limits to be obtained. Examples of results obtained using these methods are given in table 1; chemical yields for the actinides are between 75 and 100%, whereas Sr yields are rather in the order of 60 %.

Sample Code	Am yield (%)	Pu yield (%)	U yield (%)	Sr yield (%)
MAPEP-18 soil	96.2±6.33	102.2±10.5	84.0±5.64	60.0±2.8
MAPEP-20	na	na	na	66.0±6.0
10g baby food	84.6±7.5	93.5±8.1	77.9±13.1	na
10g apple	93.4±9.1	97.5±12.1	88.9±10.9	na
10g squash	88.5±3.5	97.5±5.9	77.9±13.1	na
Concrete+	85.3±6.5	89.6±7.9	76.9±4.4	na
Brick+	93.7±2.9	94.7±9.0	88.1±5.4	na

***Table 1: Results obtained using pretreatment and separation schemes presented in figures 1 and 2.* Concrete and brick samples were spiked with MAPEP-18 Soil standard.**

In the case of emergency situations, the sample size can be relatively small as requested detection limits / clearance levels are relatively high. Vajda et al.[4] proposed a method for the determination of actinides in soil and sediments in 24h on maximum 1g of sample. Pre-treatment and separation steps are shown figure 4. The authors have tested the method different standard samples, the results obtained are shown table 2.

For more information, do not hesitate to contact us and/or to download the technical data sheets from our website www.triskem-international.com



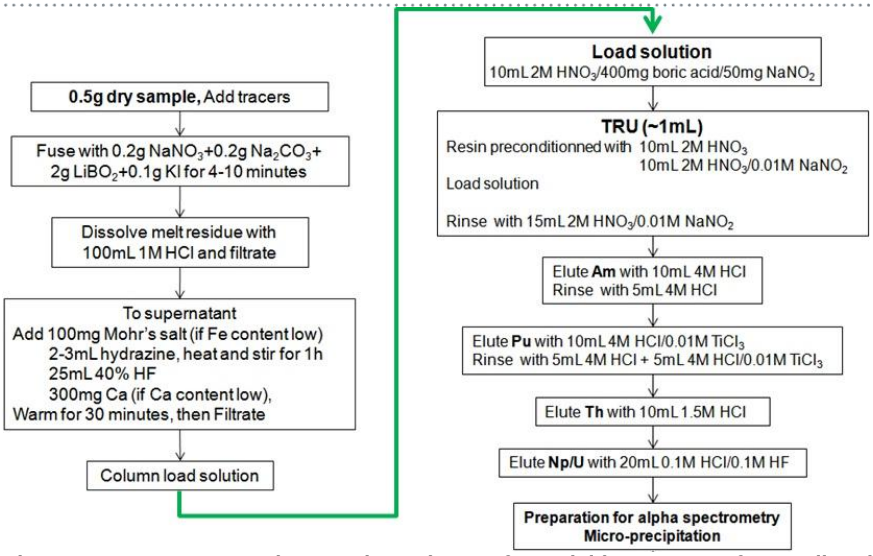


Figure 5: Pretreatment and separation schemes for actinides recovery from soil and sediment samples. [4]

Sample Code	Am yield (%)	Pu yield (%)	Th yield (%)	U yield (%)
IAEA-384	96	91	72	91
IAEA-367	100	92	95	92
IAEA-368	93	94	73	81
NIST-4357	103	91	94	91
IAEA-385	91	59	84	21
IAEA-135	89	75	83	43
Average	**96**	**85**	**84**	**75**

Table 2 : Results obtained by Vajda et al. on soil/sediment samples. [4]

Counting Time (minutes)	Average ^{90}Sr recovery (%)		
	2.86 Bq/L ^{90}Sr	5.70 Bq/L ^{90}Sr	14.3 Bq/L ^{90}Sr
20	110.1±21.7	99.3±8.4	98.1±8.4
60	100.9±8.7	103.2±2.6	97.4±2.1

Table 3 : Results obtained by Maxwell et al. on 100mL milk samples. [5]

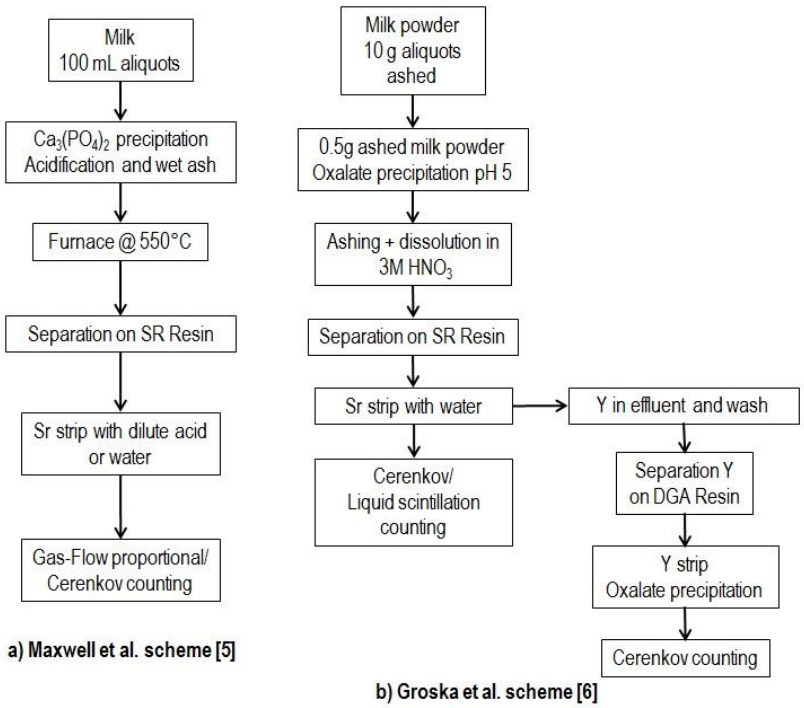


Figure 6 : Pretreatment and separation scheme for measurement of Sr89/90 in milk samples [5],[6].

Like Maxwell et al. the authors use the rapid micro-precipitation technique for the preparation of sources for α-spectometry. Reported yields are generally high (between 75 and 95 %).

Maxwell et al.[5] and Groska et al.[6] also developed methods for the rapid determination of Sr-89/90 in milk / milk powder, an outline of both methods is given in Figure 6. The method published by Maxwell et al.[5] showed on Figure 6.a) had been achieved in 8 hours for 12 samples undergoing overall process. Table 3 summarizes results obtained by the authors for samples with different Sr 90 activity levels and counting times; the authors achieve a limit of detection of 0.5Bq/L on 100mL milk sample and 20 minutes counting.

Other than Maxwell et al., Groska et al. propose the combined use of SR and DGA Resins; while SR Resin retains Sr-89/90, Y-90 passes through and is then retained and purified on DGA.

Sr-89/90 and Y-90 are collected in separate fractions and counted by Cerenkov counting, allowing for the simultaneous determination of Sr-89/90 even when present in very different activity levels.

Rapid separation techniques allow for drastically decreasing hands-on and overall separation time. However, sample pre-treatment remains a crucial and time consuming step in radioanalytical procedures especially when, in order to obtain low detection limits, large sample masses have to be analyzed. Fast fusion techniques e.g. using NaOH or Li metaborate fusion allow for rapid and efficient solubilisation of analytes from small samples. These pre-treatment methods combined with fast separation chemistry allow for obtaining reliable results in down to less than one day depending on both the nature of matrix and the size of the sample.

AGENDA

We'll be participating to the following upcoming conferences and are very much looking forward to meeting and discussing with you there!

° Advances in Liquid Scintillation Spectrometry - LSC 2013
18 – 22/03/13, Barcelona (Spain)
http://www.ub.edu/LSC2013BCN/

Please note that an international workshop will take place prior to the conference: « Plastic scintillation in practice »- 15 – 16/03/13, Barcelona (Spain) *www.ub.edu/LSC2013BCN/PS*

° COGER meeting (Co-ordinating Group for Environmental Radioactivity)
3-5/04/13, Loughborough (England)
www.coger.org.uk

° 7th International Symposium on Naturally Occurring Radioactive Material - NORM7
22-26/04/13, Beijing (China)
www.norm7.org/dct/page/1

° PROCORAD
19-21/06/13, Bucarest (Romania)
www.procorad.org

° International Workshop on Innovative Personalized Radioimmunotherapy - WIRP 2013
9-12/07/13, Nantes (France)
www.emn.fr/z-subatech/wipr-2013/

°9th International Conference on the Chemistry and Physics of Actinide Elements - ACTINIDES 2013
21-26/07/13, Karlsruhe (Germany)
http://actinides13.ine.kit.edu/

° Asia-Pacific Symposium on Radiochemistry - APSORC 2013
22-27/09/13, Kanazawa (Japan)
www.radiochem.org/apsorc13/

You will find an update on our participations to conferences on our website
www.triskem-international.com

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[2] S. Maxwell, B. Culligan, A. Kelsey-Wall and P. J. Shaw," Rapid Determination of Actinides in Emergency Food Samples », 57th Radiobioassay and Radiochemical Measurements Conference, Destin (FL)-USA, November 1, 2011

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InBrief:

Users group meetings

We are planning on having a users' group meeting next February in Italy. We'll send you more detailed information soon. In the meantime, if you have any special wishes concerning the topics to be discussed, or if you'd like to present some of your work please be so kind as to send a short mail to abombard@triskem.fr.

New products

Our aim is to provide you more resins and consumables in appropriate quantities for your radio analytical laboratory.
Additionally to the well-known formats, we will add the reference B10-S (bottles of 10g S grade Resin) for the following Resins: SR, UTEVA, TEVA, TRU, DGA, LN and RE.
From January onwards you will find the following new products in our catalogue:

- AMP-PAN Resin (determination of Cs in soft acidic media, e.g. seawater)
- KNiFC-PAN Resin (determination of Cs in urine, milk, water…)
- WBEC Resin (2nd quarter of 2013)
- MnO_2-PAN Resin
- Flow valves (pack of 20 units)
- 2ml, 4ml, 12ml Empty cartridges (pack of 20 units)
- Large column rack
- Gold Star Quanta Cocktail

We remain at your disposal to study your specific needs.

DO NOT HESITATE TO CONTACT US FOR MORE INFORMATION OR TO OBTAIN OUR NEW PRICE LIST

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